

IN THE CLAIMS

This listing of the claim will replace all prior versions and listings of claim in the present application.

Listing of Claims

1. (original) A storage system capable of transmitting data stored in a first storage control device to a third storage control device via a second storage control device,

wherein said second storage control device comprises:

a first virtual volume which is associated with a real volume and forms a pair with a copy source volume of said first storage control device;

a second virtual volume which is associated with said real volume and forms a pair with a copy destination volume of said third storage control device;

a first target port having the input side thereof connected to said copy source volume and the output side thereof connected to said first virtual volume;

a first initiator port having the input side thereof connected to said first virtual volume;

a second target port having the input side thereof connected to said first initiator port and the output side thereof connected to said second virtual volume;

a second initiator port having the input side thereof connected to said second virtual volume and the output side thereof connected to said copy destination volume;

a first control program for causing said first virtual volume to operate as an auxiliary volume of said copy source volume;

a second control program for reflecting storage contents of said first virtual volume in storage contents of said second virtual volume; and

a third control program for causing said second virtual volume to operate as the primary volume of said copy destination volume, and

wherein said real volume is mapped to said second virtual volume, and said second virtual volume is mapped to said first virtual volume.

Claim 2 (canceled).

3. (currently amended) A storage system capable of transmitting data stored in a first storage control device to a third storage control device via a second storage control device,

wherein said second storage control device comprises:

a first virtual volume which is associated with a real volume and forms a pair with a copy source volume of said first storage control device;

a second virtual volume which is associated with said real volume and forms a pair with a copy destination volume of said third storage control device;

a first control unit for reflecting storage contents of said copy source volume in storage contents of said first virtual volume;

a second control unit for reflecting storage contents of said first virtual volume in storage contents of said second virtual volume; and

a third control unit for reflecting storage contents of said second virtual volume in storage contents of said copy destination volume~~The control system according to claim 2,~~

wherein said second control unit reflects storage contents of said first virtual volume in storage contents of said first virtual volume in storage contents of said second virtual volume by copying data stored in said first virtual volume to said second virtual volume via a communication path connecting an initiator port and a target port located in the same housing.

4. (currently amended) A storage system capable of transmitting data stored in a first storage control device to a third storage control device via a second storage control device,

wherein said second storage control device comprises:

a first virtual volume which is associated with a real volume and forms a pair with a copy source volume of said first storage control device;

a second virtual volume which is associated with said real volume and forms a pair with a copy destination volume of said third storage control device;

a first control unit for reflecting storage contents of said copy source volume in storage contents of said first virtual volume;

a second control unit for reflecting storage contents of said first virtual volume in storage contents of said second virtual volume;

a third control unit for reflecting storage contents of said second virtual volume in storage contents of said copy destination volume; and~~The control system according to claim 2, further comprising~~

a first cache memory which is associated with said first virtual volume for temporarily storing data to be stored in said first virtual volume, and a second cache memory which is associated with said second virtual volume for temporarily storing data to be stored in said second virtual volume,

wherein said second control unit reflects storage contents of said first virtual volume in storage contents of said second virtual volume by copying the data stored in said first cache memory to said second cache memory.

5. (currently amended) A storage system capable of transmitting data stored in a first storage control device to a third storage control device via a second storage control device,

wherein said second storage control device comprises:

a first virtual volume which is associated with a real volume and forms a pair with a copy source volume of said first storage control device;

a second virtual volume which is associated with said real volume and forms a pair with a copy destination volume of said third storage control device;

a first control unit for reflecting storage contents of said copy source volume in storage contents of said first virtual volume;

a second control unit for reflecting storage contents of said first virtual volume in storage contents of said second virtual volume;

a third control unit for reflecting storage contents of said second virtual volume in storage contents of said copy destination volume; and
~~The control system according to claim 2, further comprising~~

a second cache memory which is associated with said second virtual volume for temporarily storing data to be stored in said second virtual volume,

wherein said second control unit reflects storage contents of said first virtual volume in storage contents of said second virtual volume by directly copying data written in said first virtual volume to said second cache memory.

Claim 6 (canceled).

7. (currently amended) A storage control device capable of transmitting data stored in a first storage control device to a third storage control device, said second storage control device comprising:

a first virtual volume which is associated with a real volume and forms a pair with a copy source volume of said first storage control device;

a second virtual volume which is associated with said real volume and forms a pair with a copy destination volume of said third storage control device;

a first control unit for reflecting the storage contents of said copy source volume in storage contents of said first virtual volume;

a second control unit for reflecting storage contents of said first virtual volume in storage contents of said second virtual volume; and

a third control unit for reflecting storage contents of said second virtual volume in storage contents of said copy destination volume.
~~The second storage control device according to claim 6,~~

wherein said real volume is mapped to said second virtual volume,
said second virtual volume is mapped to said first virtual volume,

8. (currently amended) A storage control device capable of transmitting data stored in a first storage control device to a third storage control device, said second storage control device comprising:

- a first virtual volume which is associated with a real volume and forms a pair with a copy source volume of said first storage control device;
- a second virtual volume which is associated with said real volume and forms a pair with a copy destination volume of said third storage control device;
- a first control unit for reflecting the storage contents of said copy source volume in storage contents of said first virtual volume;
- a second control unit for reflecting storage contents of said first virtual volume in storage contents of said second virtual volume; and
- a third control unit for reflecting storage contents of said second virtual volume in storage contents of said copy destination volume

~~The second storage control device according to claim 6,~~

wherein said first virtual volume and said second virtual volume are independently associated with said real volume.

9. (currently amended) A storage control device capable of transmitting data stored in a first storage control device to a third storage control device, said second storage control device comprising:

- a first virtual volume which is associated with a real volume and forms a pair with a copy source volume of said first storage control device;

a second virtual volume which is associated with said real volume and forms a pair with a copy destination volume of said third storage control device;

a first control unit for reflecting the storage contents of said copy source volume in storage contents of said first virtual volume;

a second control unit for reflecting storage contents of said first virtual volume in storage contents of said second virtual volume; and

a third control unit for reflecting storage contents of said second virtual volume in storage contents of said copy destination volume~~The second storage control device according to claim 6,~~

wherein said control unit reflects storage contents of said first virtual volume in storage contents of said second virtual volume by copying data stored in said first virtual volume to said second virtual volume via a communication path connecting an initiator port and a target port located in the same housing.

10. (currently amended) A storage control device capable of transmitting data stored in a first storage control device to a third storage control device, said second storage control device comprising:

a first virtual volume which is associated with a real volume and forms a pair with a copy source volume of said first storage control device;

a second virtual volume which is associated with said real volume and forms a pair with a copy destination volume of said third storage control device;

a first control unit for reflecting the storage contents of said copy source volume in storage contents of said first virtual volume;

a second control unit for reflecting storage contents of said first virtual volume in storage contents of said second virtual volume;

a third control unit for reflecting storage contents of said second virtual volume in storage contents of said copy destination volume; and
~~The second storage control device according to claim 6, further comprising~~

a first cache memory which is associated with said first virtual volume for temporarily storing data to be stored in said first virtual volume, and a second cache memory which is associated with said second virtual volume for temporarily storing data to be stored in said second virtual volume,

wherein said second control unit reflects storage contents of said first virtual volume in storage contents of said second virtual volume by copying data stored in said first cache memory to said second cache memory.

11. (currently amended) A storage control device capable of transmitting data stored in a first storage control device to a third storage control device, said second storage control device comprising:

a first virtual volume which is associated with a real volume and forms a pair with a copy source volume of said first storage control device;

a second virtual volume which is associated with said real volume and forms a pair with a copy destination volume of said third storage control device;

a first control unit for reflecting the storage contents of said copy source volume in storage contents of said first virtual volume;

a second control unit for reflecting storage contents of said first virtual volume in storage contents of said second virtual volume;

a third control unit for reflecting storage contents of said second virtual volume in storage contents of said copy destination volume; and
~~The second storage control device according to claim 6, further comprising~~

a second cache memory which is associated with said second virtual volume for temporarily storing data to be stored in said second virtual volume,

wherein said second control unit reflects storage contents of said first virtual volume in storage contents of said second virtual volume by directly copying data written in said first virtual volume to said second cache memory.

Claim 12 (canceled).

13. (currently amended) A storage control device capable of transmitting data stored in a first storage control device to a third storage control device, said second storage control device comprising:

a first virtual volume which is associated with a real volume and forms a pair with a copy source volume of said first storage control device;

a second virtual volume which is associated with said real volume and forms a pair with a copy destination volume of said third storage control device;

a first control unit for reflecting the storage contents of said copy source volume in storage contents of said first virtual volume;

a second control unit for reflecting storage contents of said first virtual volume in storage contents of said second virtual volume; and

a third control unit for reflecting storage contents of said second virtual volume in storage contents of said copy destination volume~~The second storage control device according to claim 6,~~

wherein at least either said first virtual volume said second virtual volume is provided in a plurality.

14. (currently amended) A storage control device capable of transmitting data stored in a first storage control device to a third storage control device, said second storage control device comprising:

a first virtual volume which is associated with a real volume and forms a pair with a copy source volume of said first storage control device;

a second virtual volume which is associated with said real volume and forms a pair with a copy destination volume of said third storage control device;

a first control unit for reflecting the storage contents of said copy source volume in storage contents of said first virtual volume;

a second control unit for reflecting storage contents of said first virtual volume in storage contents of said second virtual volume;

a third control unit for reflecting storage contents of said second virtual volume in storage contents of said copy destination volume; and~~The second storage control device according to claim 6,~~

wherein comprising a plurality of said second virtual volumes, these second virtual volumes respectively forming a pair with different copy destination volumes.

Claim 15 (canceled).

16. (original) A data relay method using a storage control device for transmitting data stored in a first storage control device to a third storage control device via a second storage control device, comprising the steps of:

- setting a first virtual volume and a second virtual volume, each being associated with a real volume, into said second storage control device;
- forming a second pair from said second virtual volume and a copy destination volume of said third storage control device;
- synchronizing storage contents of said copy source volume and storage contents of said first virtual volume;
- synchronizing storage contents of said first virtual volume and storage contents of said second virtual volume; and
- synchronizing storage contents of said second virtual volume and storage contents of said copy destination volume.